FIG. 1

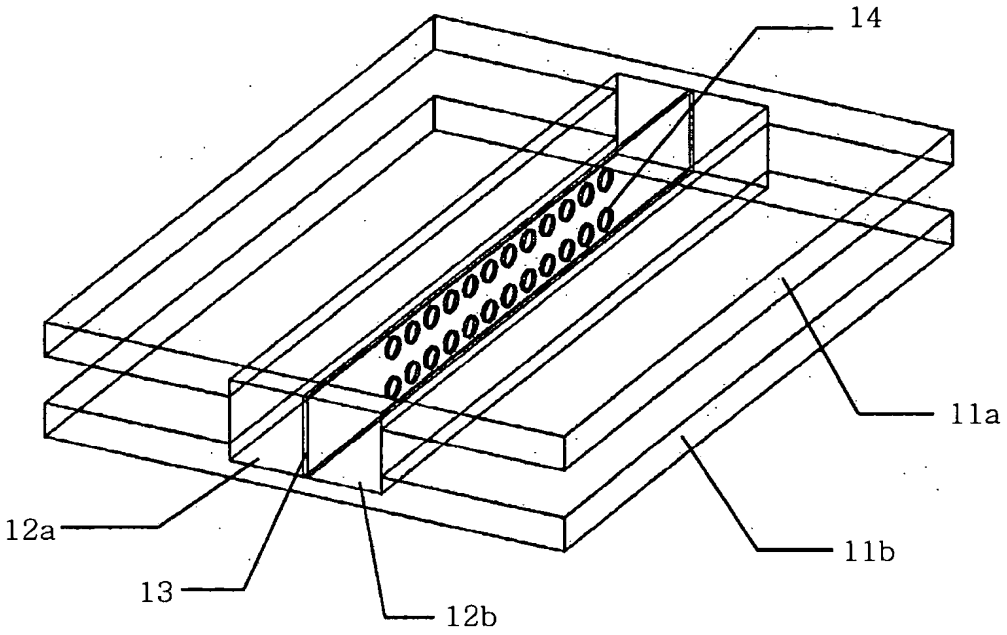


FIG. 2

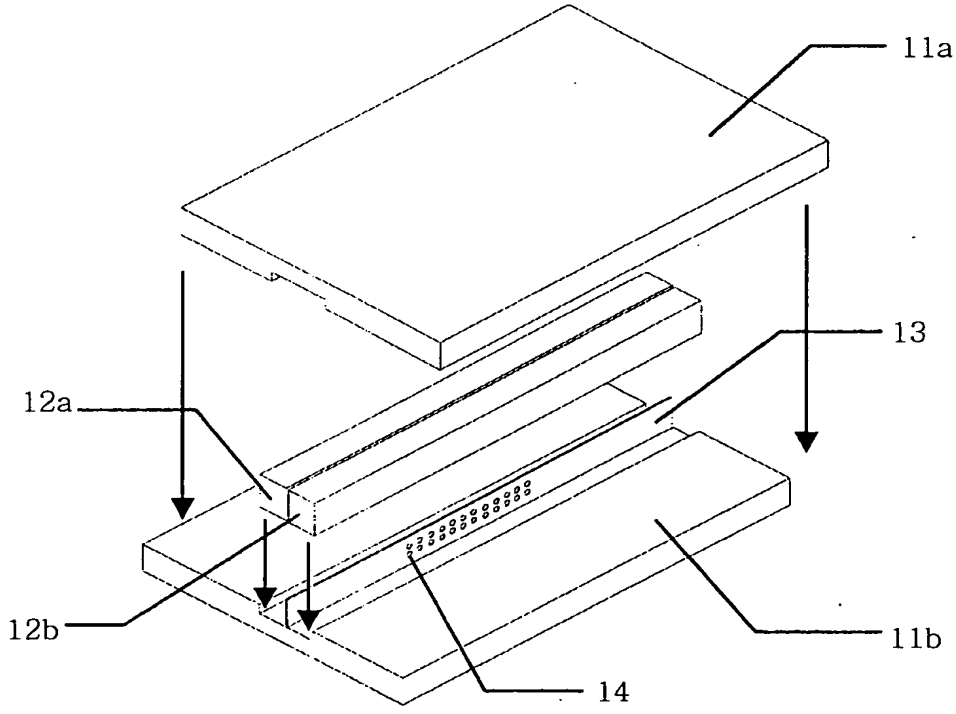

FIG. 3A

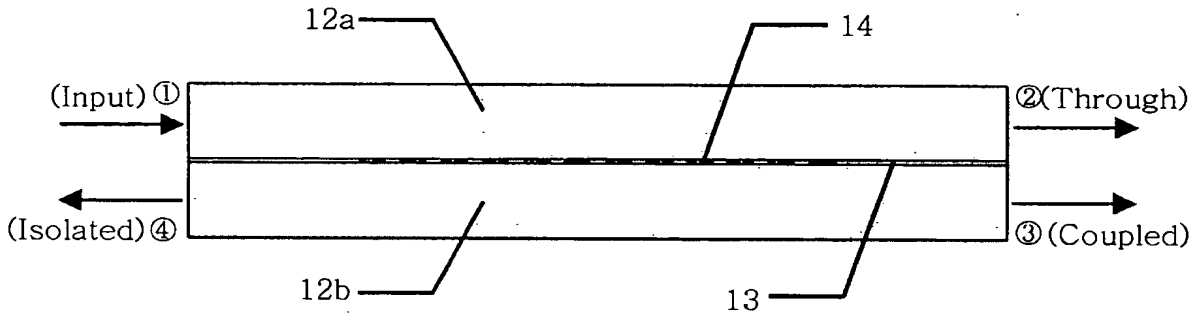


FIG. 3B

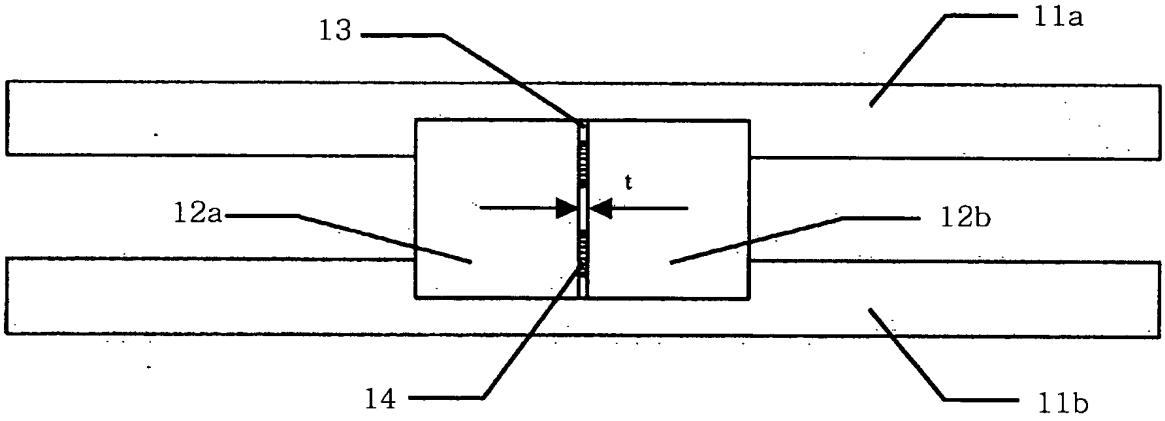


FIG. 3C

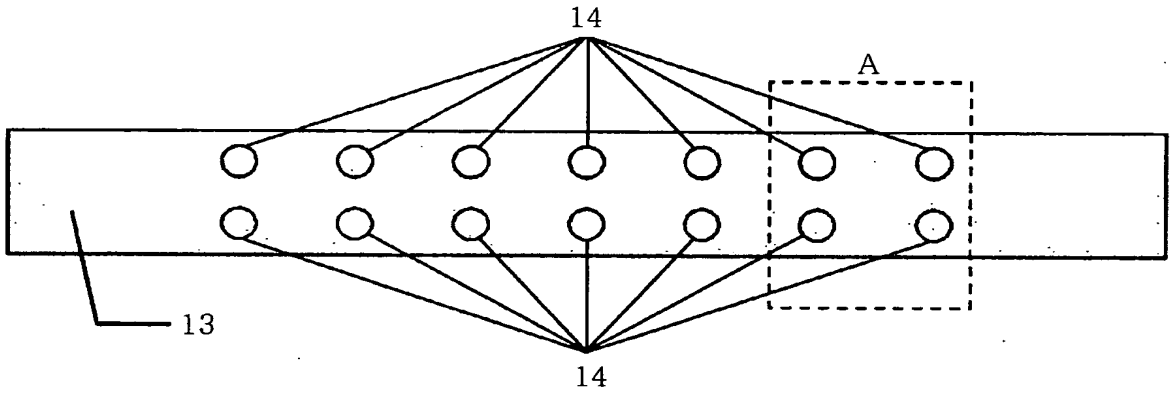

FIG. 3D

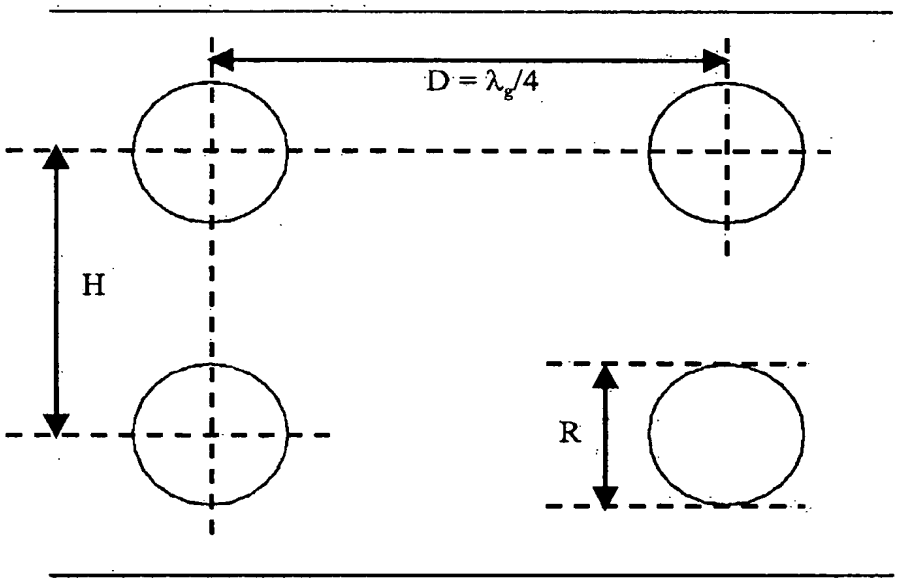
D = λg/4
H
R

FIG. 4A

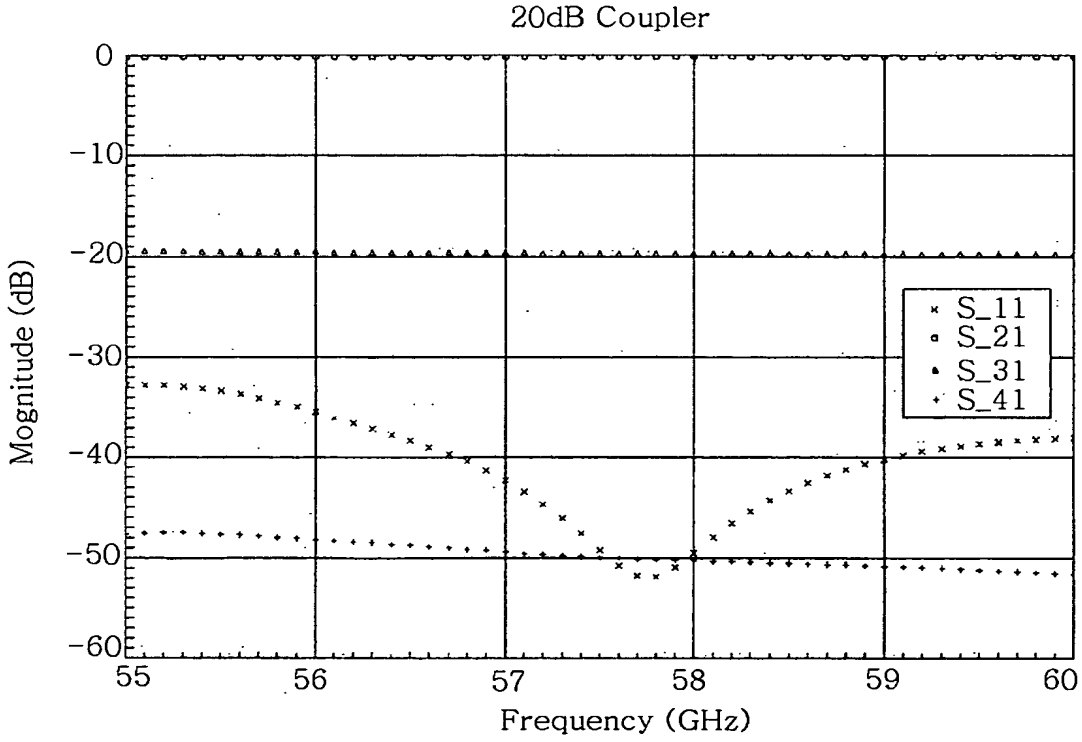
20dB Coupler
Mognitude (dB)
0
-10
-20
-30
-40
-50
-60
55
56
57
58
59
60
Frequency (GHz)
S_11
S_21
S_31
S_41

FIG. 4B

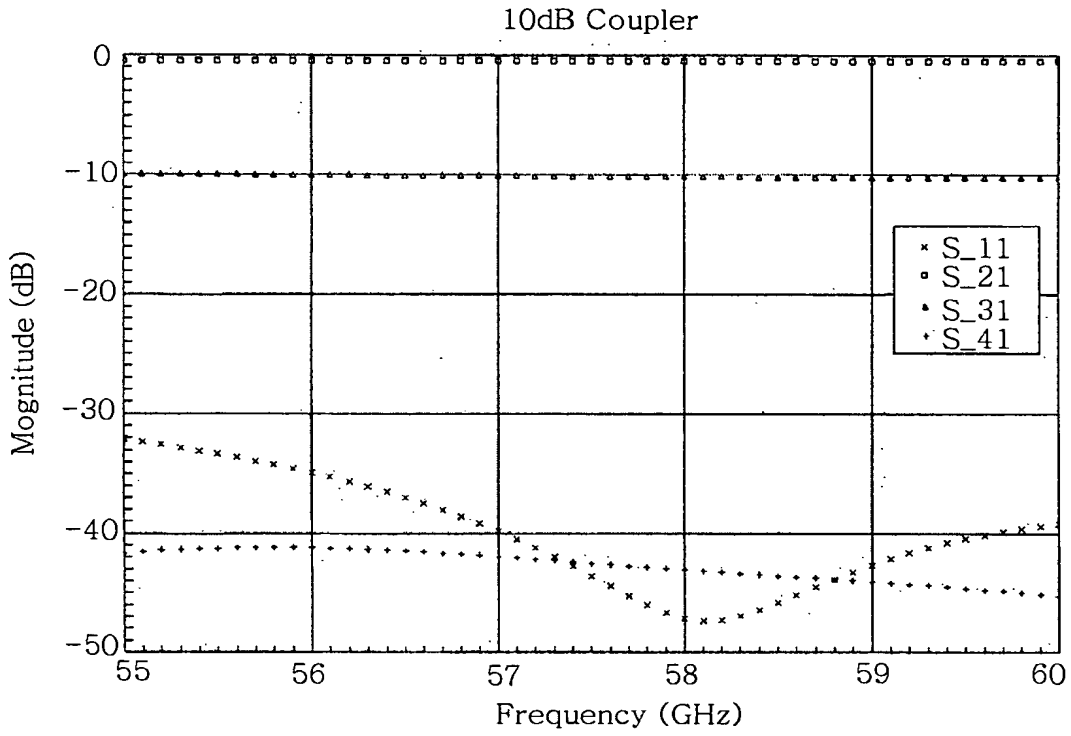
10dB Coupler
0
-10
-20
-30
-40
-50
Mognitude (dB)
55
56
57
58
59
60
Frequency (GHz)
S_11
S_21
S_31
S_41

FIG. 4C

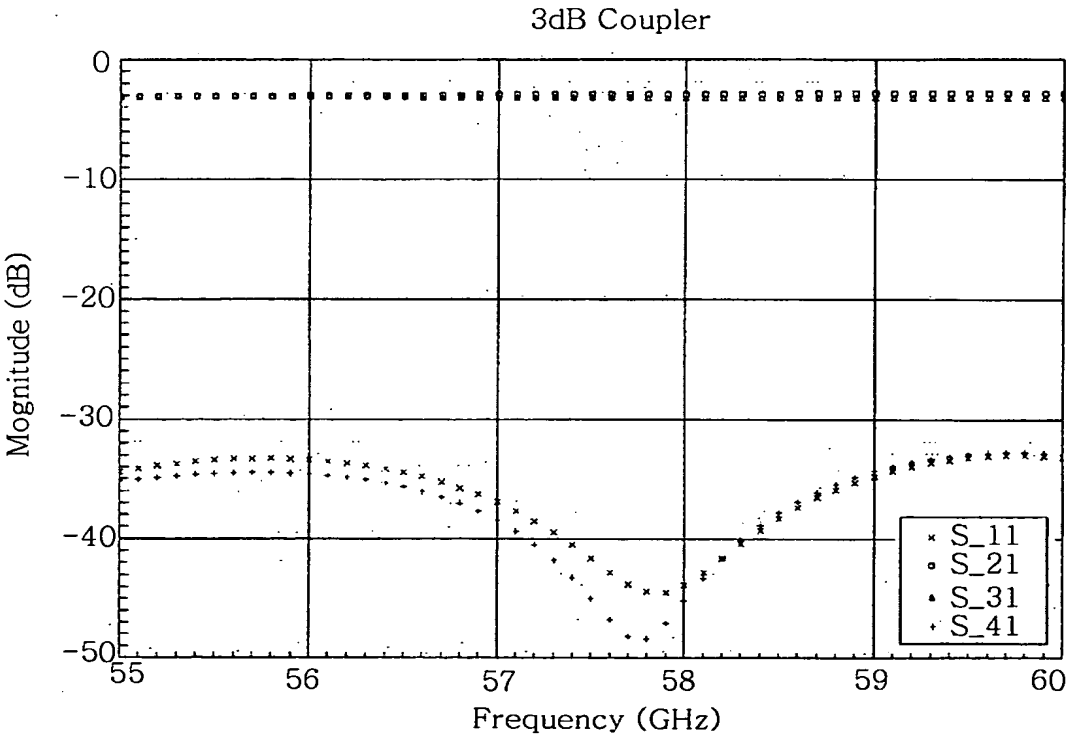
3dB Coupler
0
-10
-20
-30
-40
-50
Mognitude (dB)
55
56
57
58
59
60
Frequency (GHz)
S_11
S_21
S_31
S_41

FIG. 4D

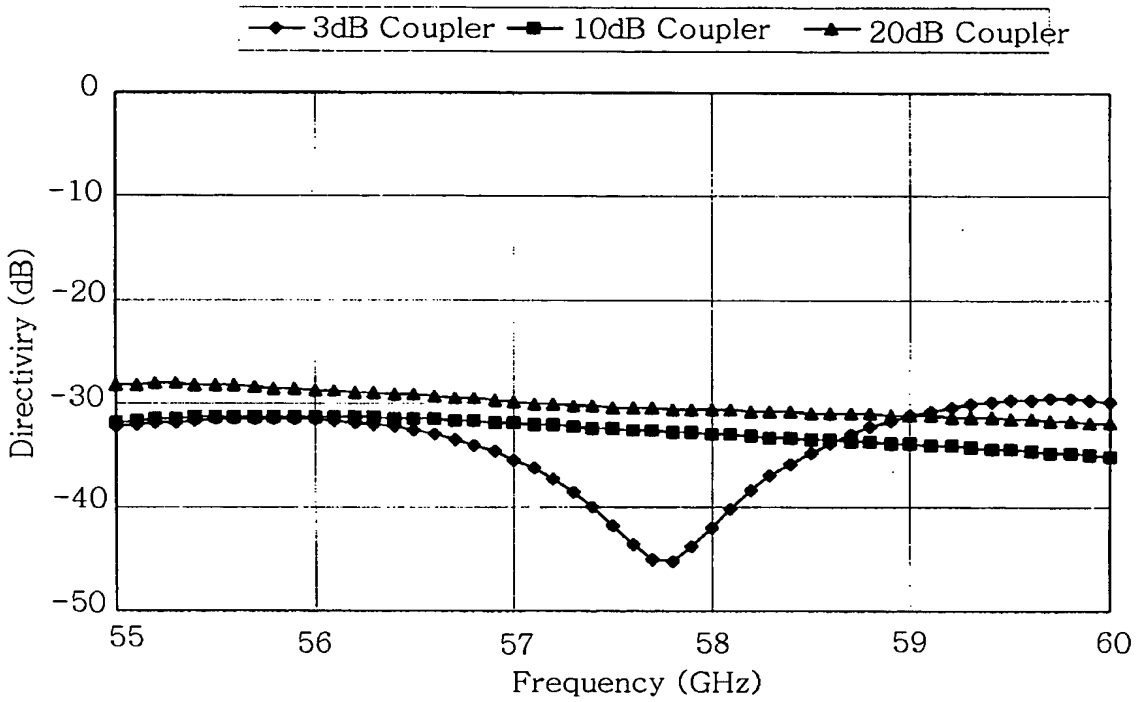
3dB Coupler
10dB Coupler
20dB Coupler
0
-10
-20
-30
-40
-50
Directiviry (dB)
55
56
57
58
59
60
Frequency (GHz)

FIG. 5

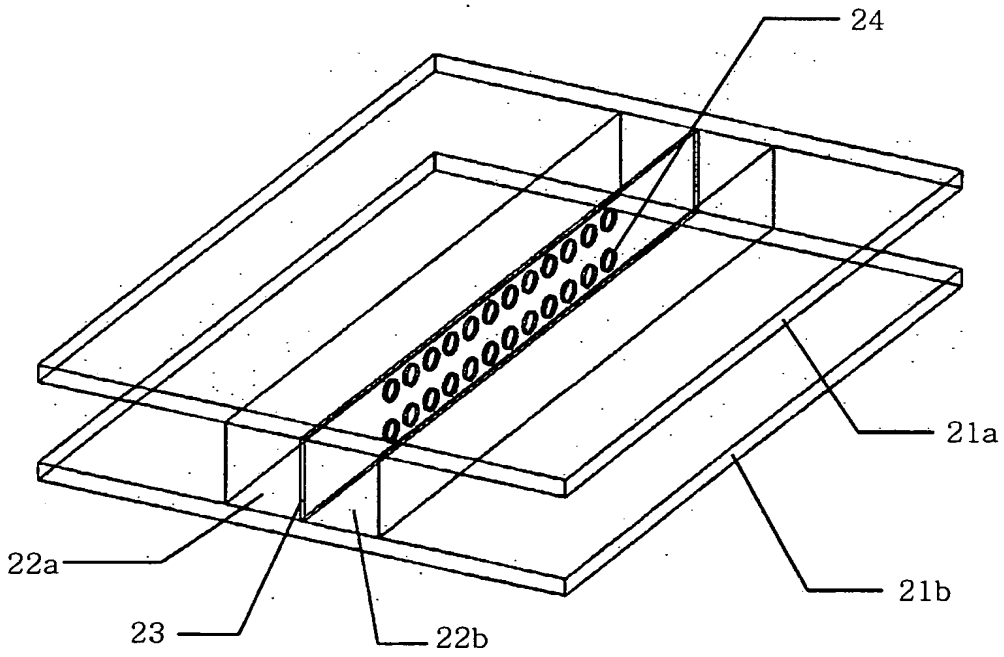
24
21a
21b
22a
23
22b

FIG. 6

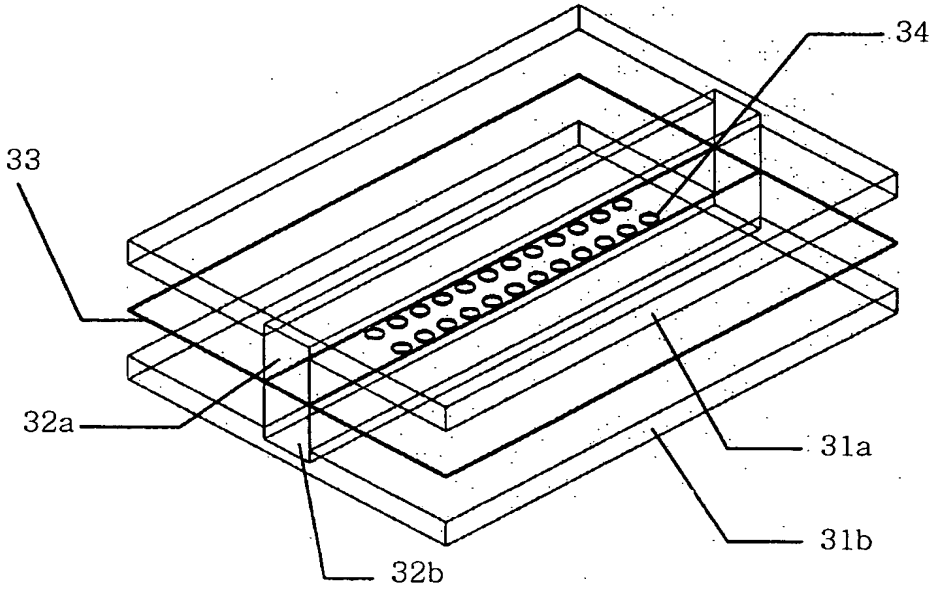


FIG. 7

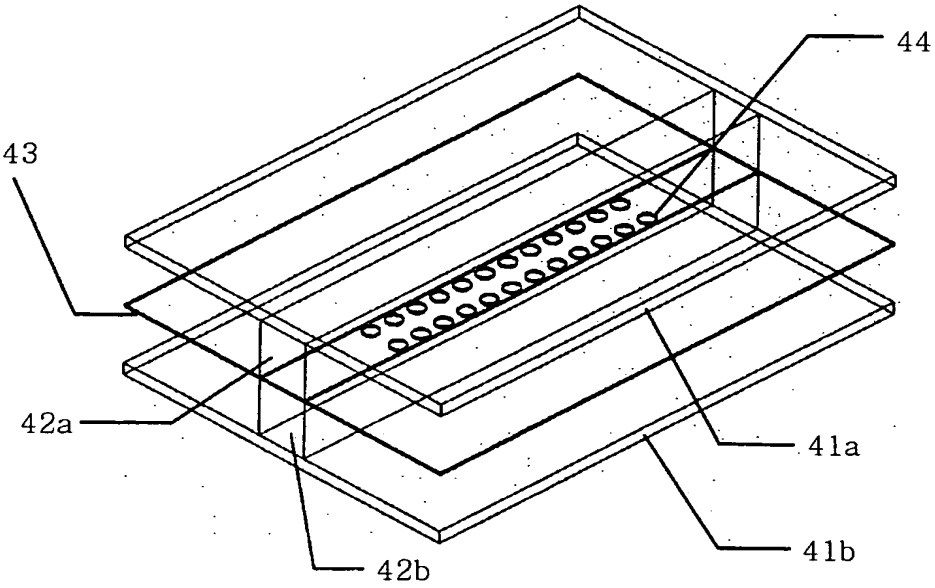

FIG. 8A

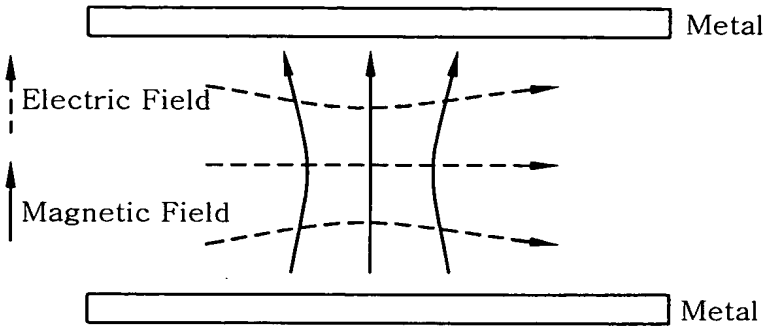


FIG. 8B

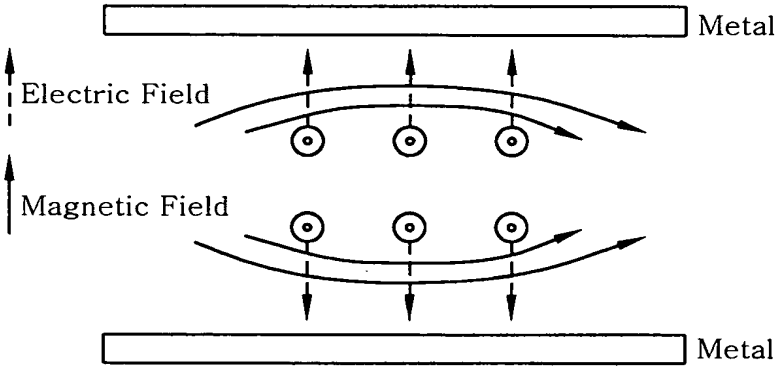


FIG. 9A

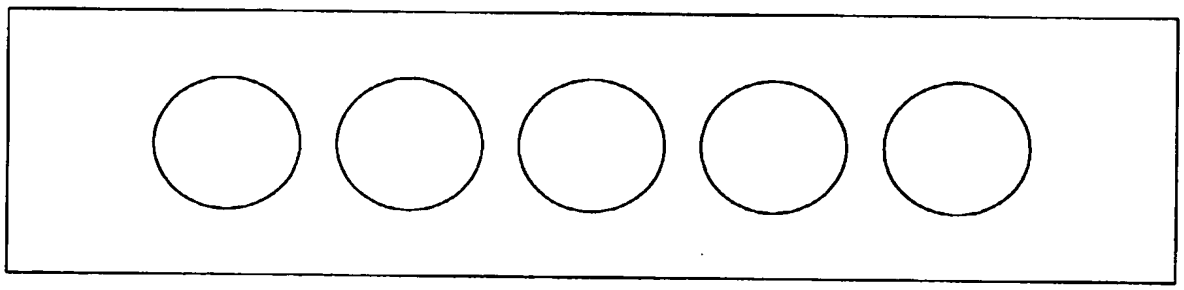

FIG. 9B

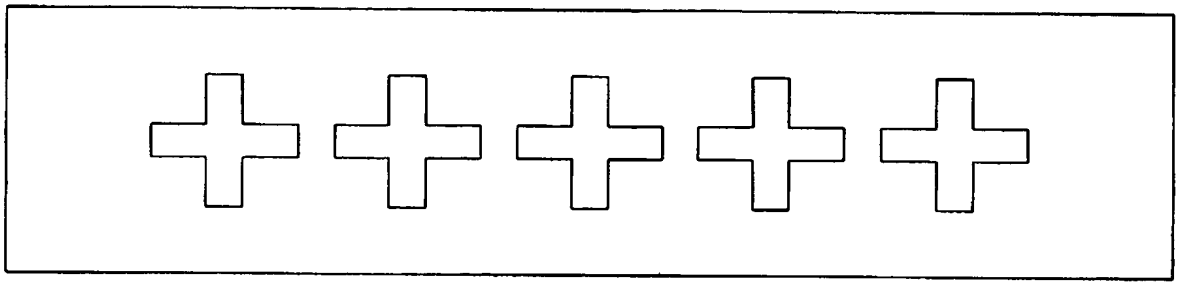

FIG. 9C

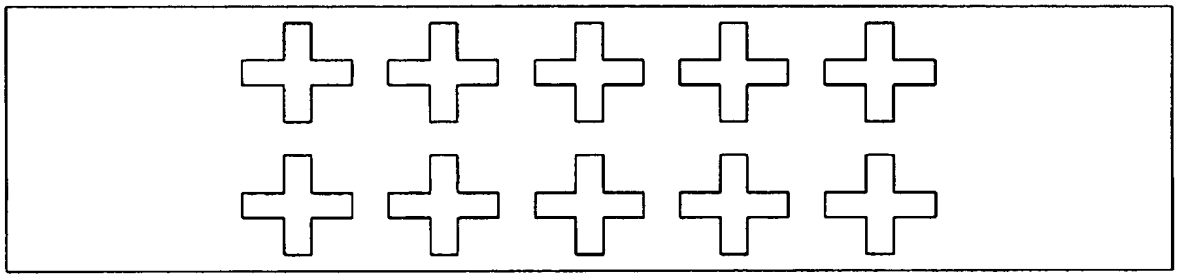

FIG. 9D

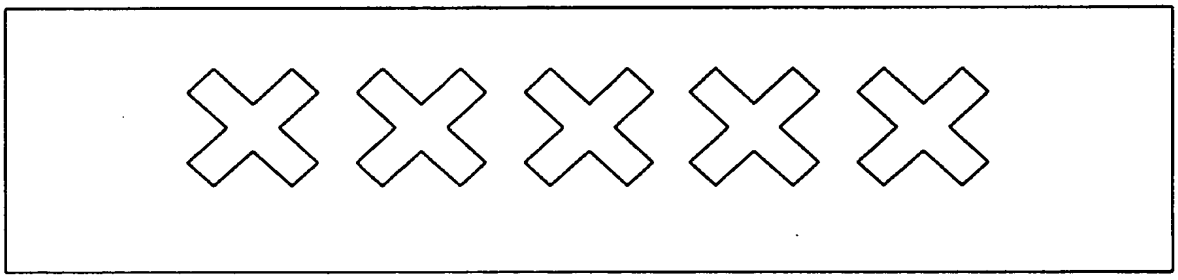

FIG. 9E

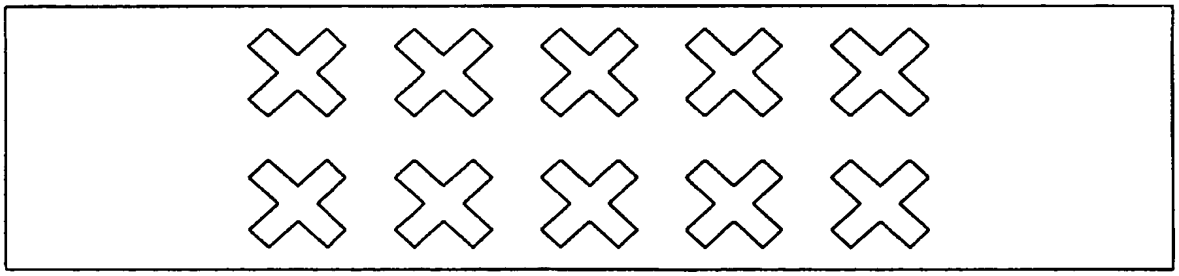

FIG. 9F

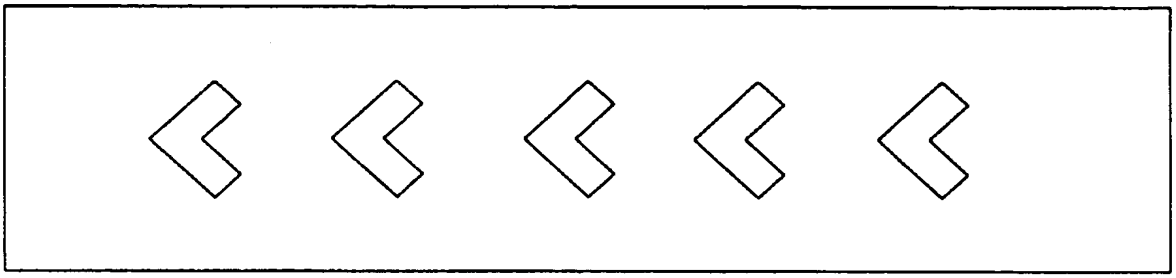

FIG. 9G

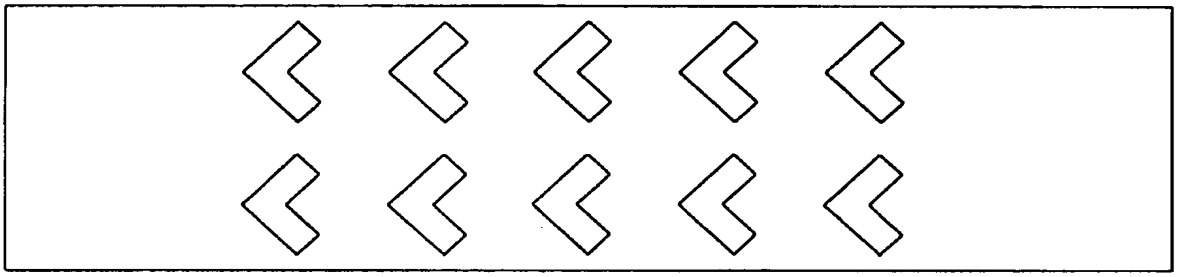

FIG. 9H

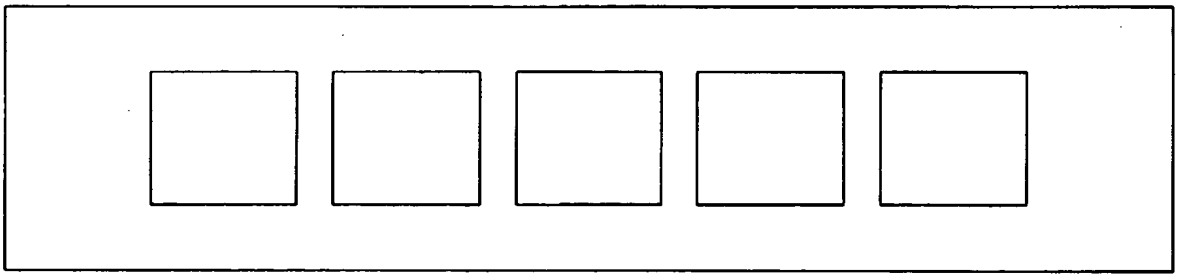
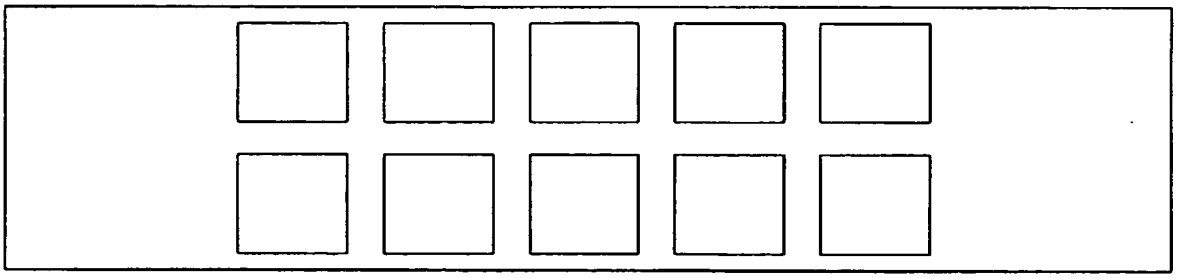
FIG. 9I